

FIELD-STRENGTH METER

10kHz to 30MHz

SPECIAL FEATURES

WIDE FREQUENCY RANGE WITHOUT SWITCHING

ONLY 2 SEPARATE WIDEBAND ANTENNAS FOR THE ENTIRE
FREQUENCY RANGE

DIRECT INDICATION OF FIELD STRENGTH IN $\text{dB}(\mu\text{V}/\text{m})$,
CURRENT IN $\text{dB}(\mu\text{A})$ AND VOLTAGE IN $\text{dB}(\mu\text{V})$.

ACCURACY COMPLYING WITH CCIR RECOMMENDATIONS

RADIO INTERFERENCE MEASUREMENTS ACCORDING TO CISPR AND VDE

EMC MEASUREMENTS TO MIL AND VG STANDARDS

RAPID AUTOMATIC VOLTAGE CALIBRATION

GENERATOR OUTPUT FOR MEASUREMENTS ON TWO-PORT NETWORKS

CHOICE OF BATTERY OR AC SUPPLY UNIT;
CONNECTIONS FOR EXTERNAL 12-V POWER SOURCE

P R E C I S E

Digital frequency display with 100-Hz resolution

Frequency synthesis for all oscillators

High measuring accuracy due to sinewave and pulse calibration

Accuracy of field-strength measurements complying with
CCIR recommendations

Excellent dynamic characteristics

E C O N O M I C A L

Attractive price

Simple evaluation of results
due to integrated intelligence

Optimum control for short measuring time

U N I V E R S A L

Frequency range 10 kHz to 30 MHz

Level measurement range > 165 dB

Separate control of RF and IF attenuators

Measurement of useful and interfering field strength,
voltage and current

Measurements on two-port networks: gain 50 dB, attenuation 100 dB

Versatile demodulation facilities

E R G O N O M I C D E S I G N

Digital frequency display

Digital display of scale reference level

Automatic setting of IF attenuator (can be switched off)

Rapid frequency selection due to selectable tuning speed

Clear arrangement of front panel controls and of inputs
and outputs

Uses and Characteristics

The Field-strength Meter HFH 2 is designed for measurements on useful fields (propagation, coverage, antenna patterns, monitoring and surveillance) as well as on interfering fields in compliance with MIL, CISPR, VDE and VG specifications in the frequency range from 10 kHz to 30 MHz. The meter consists of Test Receiver ESH 2, Rod Antenna HFH 2-Z1, Loop Antenna HFH 2-Z2, a tripod and various accessories.

The Test Receiver ESH 2 permits, besides all common selective measurements, also radio noise voltage measurements to CISPR and VDE to be carried out as well as interference current measurements to MIL and VG when using suitable transducers.

The receiver is designed to the latest state of the art with the aid of computer programs and it is especially notable for its dynamic characteristics, measuring accuracy combined with simple use, its dimensions and the possibility for internal battery operation. These features make it particularly suitable for fixed and mobile operation.

The built-in intelligence permits:

- 1) consideration of antenna and transducer factors and thus correct, direct indication of measured quantities,
- 2) immediate recognition when one of the important receiver stages is overdriven,
- 3) control of IF attenuator switch as a function of bandwidth and indication mode in order to ensure the minimum signal/noise ratio required for the indication,
- 4) pulse calibration with CISPR indication, sinewave calibration with average and peak-value indication,
- 5) rapid voltage calibration e.g. automatic calibration when changing bandwidth,
- 6) automatic selection of RF input filters.

These characteristics ensure rapid, accurate, easy and reproducible performance of all measurements in this frequency range.

SPECIFICATIONS

Field-strength Meter HFH 2:

Measurement range

Frequency range 10 to 150 kHz:

with Rod Antenna HFH2-Z1

lower limit (dep. on frequency)	10 to -3 dB ($\mu\text{V/m}$)
upper limit	140 dB ($\mu\text{V/m}$)

with Loop Antenna HFH2-Z2

lower limit (dep. on frequency)	35 to 20 dB ($\mu\text{V/m}$)
upper limit	140 dB ($\mu\text{V/m}$)

Frequency range 150 kHz to 30 MHz:

with Rod Antenna HFH2-Z1

lower limit	-3 dB ($\mu\text{V/m}$)
upper limit	140 dB ($\mu\text{V/m}$)

with Loop Antenna HFH2-Z2

lower limit (dep. on frequency)	20 to 6 dB ($\mu\text{V/m}$)
upper limit	140 dB ($\mu\text{V/m}$)

Measurement error (incl. antennas)	< 2 dB (from 10 dB above lower measurement limit: below this level intrinsic noise must be taken into account)
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The antenna factor k is automatically taken into account in the indication: The field-strength level is directly indicated on the meter of Test Receiver ESH2.

Exception: The antenna factor of Loop Antenna HFH2-Z2 is in the range from 10 to 150 kHz frequency-dependent (correction curve). For this range we recommend the use of Loop Antenna HFH2-Z3, which permits sensitive measurements in the range from 10 to 150 kHz where the antenna factor (see 'Recommended Extras') is automatically taken into account.

Antennas:

Rod Antenna HFH2-Z1:

Frequency range	10 kHz to 30 MHz
Connector	BNC plug
Source impedance	50 Ω
Antenna factor k	20 dB
Length of antenna	1 m

Loop Antenna HFH2-Z2:

Frequency range	10 kHz to 30 MHz
Connector	BNC plug
Source impedance	50 Ω
Antenna factor k	10 kHz to 150 kHz 35 to 20 dB (frequency-dependent)
	150 kHz to 30 MHz 20 dB
Loop diameter	60 cm

Loop Antenna HFH2-Z3: (is not part of the 'Equipment supplied')

Frequency range	10 kHz to 150 kHz
Connector	BNC plug
Source impedance	50 Ω
Antenna factor k	10 dB
Field-strength measurement range when used together with Test Receiver ESH2:	
lower limit (dep. on frequency)	8 to 4 dB(μ V/m)
upper limit	140 dB(μ V/m)
Side length of loop	240 cm
Weight	17 kg, with transport case 43 kg

Test Receiver ESH 2

Frequency range	10 kHz to 29.9999 MHz
Frequency indication	6 digit LCD, (can be illuminated)
Frequency resolution	100 Hz
Setting error:	10 kHz to 150 kHz 100 Hz
	150 kHz to 30 MHz < 500 Hz
Voltage measurement range:	
(lower limit fixed by 3 dB noise contribution)	
Average value	-30 to +137 dB(μ V)
Peak value	- 3 to +140 dB(μ V/10 kHz)
Noise indication (IF bandwidth 200 Hz, lin. av.-value ind.)	typ. -30 dB(μ V)
Max. input voltage	
at 0 dB RF atten.	3 V corresp. to 130 dB(μ V)
Max. input voltage	
at 10 dB RF atten.	7 V corresp. to 137 dB(μ V)
Voltage indication	Moving-coil meter (can be illuminated)
Indication ranges	linear 20 dB
	log. 40 dB
	log. 60 dB

Indicating modes	Average value peak value with 1 s hold time peak value with 3 s hold time CISPR Publ. 1 and 3
Error of voltage indication (linear average-value ind.)	$< 1 \text{ dB (BW=0,2 kHz, } V_{in} > -10 \text{ dB}(\mu\text{V}))$
Calibration facility	Sinewave and pulse gen.
IF bandwidths (6 dB) (for average and peak value measurements)	0.2 kHz (when measuring sinewaves) 0.5 kHz reduced measurement 2.4 kHz accuracy at 0.2 kHz) 10.0 kHz
IF bandwidths (6 dB) (for measurements to CISPR Publ. 1 + 3 and to VDE 0875)	0.2 kHz 9.0 kHz
Demodulated classes of emission	F3, A0, A1, A3, A3J (USB/LSB)
Image frequency rejection	$> 100 \text{ dB, typ. } 120 \text{ dB}$
IF rejection	$> 100 \text{ dB, typ. } 110 \text{ dB}$
<u>RF input:</u>	BNC female
Input impedance	50Ω
VSWR	
at 0 dB RF attenuation	< 2
at $\geq 10 \text{ dB}$ RF attenuation	< 1.2
Oscillator reradiation	$< 1 \mu\text{V}$
Intercept point d_3 at 0 dB d_2 RF Atten. k_2	typ. +25 dBm typ. +55 dBm typ. +70 dBm
<u>Outputs:</u>	
<u>Front panel:</u>	
Generator output (can be switched off)	BNC female
Source impedance	50Ω
EMF	$86 \text{ dB } (\mu\text{V}) \pm 0.5 \text{ dB}$
Connector for antenna supply and coding	12-pole Tuchel connector (female)
AF output	JK 34 jack
Source impedance	10Ω
EMF	adjustable up to 3.5 V
<u>Rear:</u>	
30-kHz IF output	BNC female
Source impedance	1 k
EMF	2 V for fsd on meter

AM demodulator output	BNC female
Source impedance	10 k Ω
EMF	1 V/100% mod. depth
FM demodulator output	BNC female
Source impedance	10 k Ω
EMF	± 0.5 V for 5 kHz dev.
Input for external reference volt.	BNC female
Level	EMF 1 V out of 50 Ω , sinewave
Frequency	5/10 MHz (selectable)
<u>Recorder outputs:</u>	50-pole connector (Amphenol)
Output for frequency offset:	
Source impedance	10 k Ω
EMF	± 5 V for 5 kHz offset
Level output 1:	
Source impedance	10 k Ω
EMF (with average, peak and peak 3-s indication)	± 5 V for fsd on meter
EMF (with CISPR indication)	± 2 V for fsd on meter
Level output 2:	includes a lowpass network for simulation of panel-instrument response. Source resistance and EMF as for level output 1
<u>Supply voltage inputs:</u>	
Battery input 12 V	3-pole special socket
Charging input 12 V	3-pole special socket
<u>General data</u>	
Nominal temperature range	-10 to +45°C
Storage temperature range	-25 to +70°C without battery
Power supply	either int. AC power supply unit or battery
Power supply section	complies with protection class II (isolated) to VDE 0411
The power supply is also used as battery charger	
Operating time with fully charged battery	approx. 4 h (dep. on ambient temperature)
Dimensions WxHxD	339 mm x 198 mm x 484 mm
Weight	21 kg with built-in power supply unit 22 kg with built-in battery

Order designations:

Field-strength Meter HFH2 335.3015.52

Equipment supplied (the instruments can also be ordered separately):

Test Receiver 10 kHz to 30 MHz ESH2 303.2020.52
(accessories supplied: battery unit
(without battery), connector for external
battery, manual)

Rod Antenna HFH2-Z1 10 kHz to 30 MHz 335.3215.52

Loop Antenna HFH2-Z2 10 kHz to 30 MHz 335.4711.52

Tripod HFU-Z (in transport bag) 100.1114.02

Inductive antenna probe HFH2-Z4 338.3016.52

Manual

Recommended Extras (to be ordered separately):

Loop Antenna HFH2-Z3 10 kHz to 150 kHz 335.6214.52

RF Current Probe 0,1 to 30 MHz ESH2-Z1 338.3516.52

2 sealed 6-V lead storage batteries,
capacity: min. 8.5 Ah

R&S Stock No. for 1 battery 338.4012.00

Batteries of the following types can be used:

Sonnenschein, D-6470 Bldingen, Typ 3Fx5S

Varta, D-3000 Hannover, Typ accu- Pb 6 V 9.5 Ah

Elpower Corp., Santa Ana, Ca., USA, Typ EP 685A-16